

AMENDMENTS TO THE SPECIFICATION

Please amend the paragraph beginning on page 6, line 7 as follows:

Disclosure of Summary of the Invention

The present invention has been made in view of the above drawbacks. It is, therefore, a first object of the present invention to provide a substrate processing apparatus and a substrate processing method which can prevent a fluid such as a processing liquid from being scattered from a substrate and a substrate holder while cleaning and drying the substrate, and can eliminate the remaining fluid on the substrate holder and can also accelerate replacement of the fluid.

Please amend the paragraph beginning on page 13, line 2 as follows:

Generally, when a liquid is sucked through the holder suction unit and the periphery suction unit, the liquid and air are ~~mix~~ mixed with each other and friction occurs therebetween. Accordingly, a static electricity is likely to be generated due to the friction and thus the substrate may be charged. The charged substrate has an adverse effect on circuits formed on the surface of the substrate to cause a reduction of a yield of products. According to the present invention, since the respective conductive portions of the holder suction unit and the periphery suction unit are grounded, the substrate is prevented from being charged due to the static electricity.

Please amend the paragraph beginning on page 13, line 13 as follows:

According to another aspect of the present invention, there is provided a substrate processing apparatus comprising: a substrate holder for holding and rotating a substrate; a first gas supply nozzle and a second gas supply nozzle disposed above and below the substrate, respectively, for supplying a gas to the substrate; a first liquid supply nozzle and a second liquid supply nozzle disposed above and below the substrate, respectively, for supplying a liquid to the substrate; a first moving mechanism for moving the first gas supply nozzle and the first liquid supply nozzle from a central portion to a peripheral portion of the substrate; and a second moving mechanism for moving the second gas supply nozzle and the second liquid supply nozzle from the central portion to the peripheral portion of the substrate; ~~wherein the~~ The first liquid supply

nozzle is disposed outwardly of the first gas supply nozzle in a radial direction of the substrate, and the second liquid supply nozzle is disposed outwardly of the second gas supply nozzle in the radial direction of the substrate.

Please amend the paragraph beginning on page 16, line 32 as follows:

In a preferred aspect of the present invention, the substrate processing method further comprises: supplying a cleaning fluid from a holder cleaning unit to the substrate holder so as to process the fluid which has been moved to the substrate holder; and sucking the fluid, which has been processed by the cleaning fluid, through the holder suction unit; ~~wherein the~~. The holder suction unit is disposed ~~at the~~ forward of the holder cleaning unit in a rotational direction of the substrate holder.

Please amend the paragraph beginning on page 18, line 1 as follows:

According to another aspect of the present invention, there is provided a substrate processing apparatus comprising: a substrate holder for holding and rotating a substrate; at least one fluid supply port for supplying a fluid to the substrate which is being rotated; and at least one fluid suction port for sucking the fluid on the substrate; ~~wherein the~~. The fluid supply port and the fluid suction port are disposed closely to the substrate.

Please amend the paragraph beginning on page 19, line 3 as follows:

In a preferred aspect of the present invention, the substrate processing apparatus further comprises a substrate processing unit having the fluid supply port and the fluid suction port; ~~wherein the~~. The substrate processing unit has a first operation section in which the fluid supply port and the fluid suction port are disposed.

Please amend the paragraph beginning on page 19, line 32 as follows:

According to another aspect of the present invention, there is provided a substrate processing method, comprising: rotating a substrate; supplying a fluid from at least one fluid

supply port to the substrate which is being rotated; and sucking the fluid on the substrate through at least one fluid suction port; ~~wherein the~~. The fluid supply port and the fluid suction port are disposed closely to the substrate.

Please amend the paragraph beginning on page 20, line 6 as follows:

According to another aspect of the present invention, there is provided a substrate holding apparatus comprising: a plurality of rollers which are brought into contact with an edge portion of a substrate so as to hold and rotate the substrate; and at least one moving mechanism for moving the rollers; ~~wherein the~~. The rollers are moved in a radial direction of the substrate.

Please amend the paragraph beginning on page 26, line 9 as follows:

~~Best Mode for Carrying Out~~ Detailed Description of the Invention

Embodiments of the present invention will be described below with reference to the drawings.

Please amend the paragraph beginning on page 29, line 2 as follows:

The clamp portions 21 of the substrate holders 11 are brought into contact with the edge portion of the substrate W to press the substrate W toward an inward side of the substrate W under the predetermined pressing forces. It is preferable that the clamp portions 21 have a recessed shape (i.e., comprises a groove) so that the substrate W is not disengaged from the clamp portions 21 while being held and rotated. It is also preferable that the clamp portions 21 have a complete round (annular) shape as viewed from right above. The clearance between the holder suction nozzle 24 and the clamp portion 21 is preferably not more than 1 mm, more preferably not more than 0.5 mm. The rollers 20 should preferably be made of a fluororesin such as PVDF or PEEK, which has a chemical resistance, or polyurethane. The clearance (positional relationship) between the holder cleaning nozzle 26 and the clamp portion 21 is preferably not more than 1 mm, more preferably not more than 0.5 mm, as with the clearance between the holder suction nozzle 24 and the clamp portion 21.

Please amend the paragraph beginning on page 29, line 19 as follows:

If the holder suction nozzle 24 is not provided, a fluid that has adhered to the clamp portion 21 is brought into contact with the substrate W again by the rotation of the roller 20, and the fluid is thus scattered in tangent directions X of the substrate W and the roller 20 (see FIG. 2A). In order to prevent such a scattering of the fluid, the suction mouth 23 and the supply mouth 25 are arranged as follows: If the roller 20 is rotated in a direction indicated by arrow in FIG. 2A, the holder cleaning nozzle 26 having the supply mouth 25 is positioned at the forward side of a contact portion Wc between the clamp portion 21 and the substrate W in the rotational direction of the roller 20. Further, the holder suction nozzle 24 having the suction mouth 23 is positioned at the forward side of the holder cleaning nozzle 26 in the rotational direction of the roller 20. When the roller 20 is rotated in the direction indicated by the arrow in FIG. 20A, the fluid on the peripheral portion of the substrate W is moved to the clamp portion 21 of the roller 20 via the contact portion Wc, and then the clamp portion 21 to which the fluid has adhered is cleaned with the cleaning fluid supplied from the supply mouth 25 of the holder cleaning nozzle 26. As the roller 20 is rotated, the fluid, which has been processed by the cleaning fluid, reaches in the front of the suction mouth 23 of the holder suction nozzle 24, and is then sucked by the holder suction nozzle 24. This arrangement can prevent the fluid from being scattered from the peripheral portion of the substrate W. Therefore, it is possible to prevent contamination of the substrate W and prevent water marks from being produced. Further, because the fluid on the peripheral portion of the substrate W is sucked by the bevel suction nozzle 16, the fluid can be removed from the peripheral portion of the substrate W even when the substrate W is rotated at a low rotational speed.

Please amend the paragraph beginning on page 31, line 5 as follows:

In a case where the fluid on the substrate is sucked by the bevel suction nozzle 16 or other non-illustrated suction nozzle, the roller 20 is not necessarily cleaned and thus it is possible to dispense with the holder cleaning nozzle 26. In this case, as shown in FIG. 2D, the holder suction nozzle 24 is preferably disposed on lines tangent to the roller 20 and the substrate W and

positioned at the forward side of the contact portion Wc in the rotational direction of the roller 20 and the substrate W. Further in this case, it is preferable that the suction mouth 23 of the holder suction nozzle 24 faces toward the contact portion Wc and positioned closely to the contact portion Wc. The holder suction nozzle 24 may be disposed in such a state that the suction mouth 23 is kept in contact with the fluid retained on the contact portion Wc.

Please amend the paragraph beginning on page 41, line 10 as follows:

Generally, when a substrate is dried, a color of a surface thereof is changed. Specifically, as a thickness of a liquid film on the surface of the substrate is changed, the manner of reflection of a light is changed. Therefore, there is a difference in color of the surface between the wet substrate and the dried substrate. It is preferable that the substrate processing apparatus has an optical device (e.g., a CCD, a reflectometer, an interference-type optical measuring device) for detecting a dryness of the substrate. A monitor may be provided for monitoring the dryness of the substrate so that the movement speeds of the gas supply nozzles 13 and 14 are automatically adjusted according to the dryness of the substrate. For example, a portion of the substrate at the forward side of the gas supply nozzle by a distance of 10 mm in the moving direction of the gas supply nozzle is monitored so that if the color of this portion is changed into a preset color to indicate the dried state, then the gas supply nozzle is started to be moved toward the peripheral portion of the substrate W. According to such a control process, even if areas of the object portions to be dried vary as the gas supply nozzles 13 and 14 are moved in the radial direction of the substrate W, the substrate W can be dried uniformly.

Please amend the paragraph beginning on page 79, line 5 as follows:

Periods of the reciprocating movements of the cleaning nozzles 12 and 15 in the radial direction of the substrate W are required to be longer than a rotational period of the substrate W. If the rotational period of the substrate W and the periods of the reciprocating movements of the cleaning nozzles 12 and 15 are the same as each other, then the fluid is supplied and sucked at a constant position on the substrate W at all times, thus causing a non-uniform process. In contrast

thereto, if the periods of the reciprocating movements of the cleaning nozzles 12 and 15 are longer than the rotational period the substrate W, then the substrate W makes several rotations, for example, while the cleaning nozzles 12 and 15 make one reciprocating movement. As a result, the fluid is supplied to and sucked from the substrate in a swirling pattern (see FIGS. 22B and 22D). On the other hand, if the periods of the reciprocating movements of the cleaning nozzles 12 and 15 are shorter than the rotational period of the substrate W, then ~~trace~~ tracing of the fluid on the substrate W becomes very complicated (see FIG. 22C). In the present embodiment, since the fluid is sucked from the substrate W after a certain time has passed from when the fluid is supplied to the substrate, a sufficient time is given to the reaction of the fluid, thus enabling a uniform process.